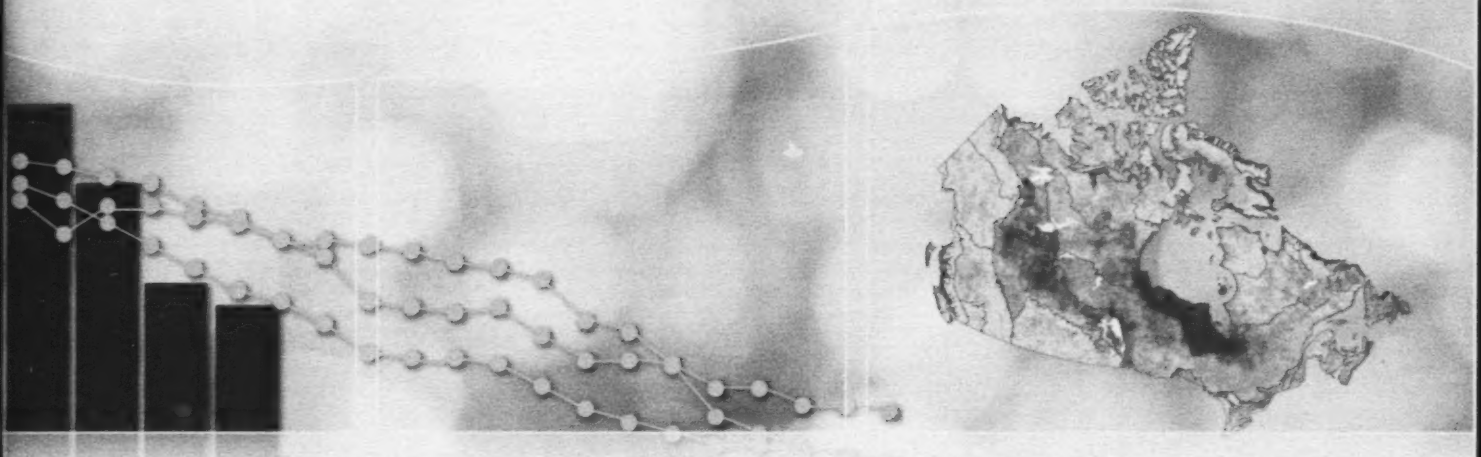
Environment and Climate Change Canada
Environnement et Changement climatique Canada

Canadian Environmental Sustainability Indicators

Ecological integrity of national parks



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Canadian Environmental Sustainability Indicators

Ecological integrity of national parks

June 2018

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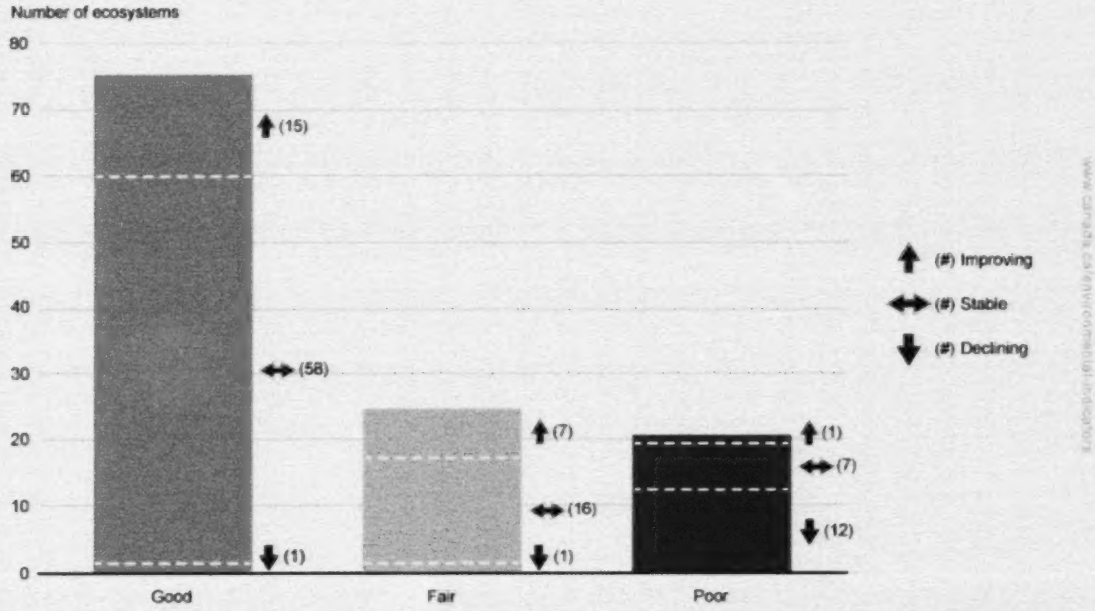
Ecological integrity of national parks

Ecosystems have integrity when their native species, landscapes and functions are intact.[1] The ecological integrity of national parks is assessed by monitoring representative components of major park ecosystems, such as forest, freshwater and wetlands. It is a key measure of the condition of our national parks.

Key results

- Of the 118 ecosystems in 42 national parks that were assessed:
  - 63% are in good condition
  - 20% are in fair condition
  - 17% are in poor condition
- Most park ecosystems are stable (81 of 118 or 69%), 23 have improving trends, and 14 have declining trends

Figure 1. Ecological integrity status and trends of ecosystems in 42 national parks, Canada, 2017



Data for Figure 1

Note: Park ecosystems may include forest, freshwater, wetlands, grasslands, shrublands, tundra, coastal/marine and glaciers, depending on what is present in each park. Akami-Uapishk^{U}-KakKasuak-Mealy Mountains, and Nááts'ihch'oh National Park Reserves and Auyuittuq and Qausuittuq National Parks did not report ecological integrity indicators in 2017. Rouge National Urban Park has also not yet reported.
Source: Parks Canada (2018).

Key measures are selected to represent each ecosystem's overall condition. Each of these measures is compared to threshold values and assigned a score. The scores within each ecosystem are then averaged together to generate an ecosystem rating.

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[1] Parks Canada (2018) Ecological integrity. Retrieved on May 10, 2018.

Most of the ecosystems that improved were forest or freshwater systems (14 systems). Most of the declining ecosystems were freshwater or tundra (9 systems).

Table 1. Ecological integrity trends by ecosystem type, Canada, 2017

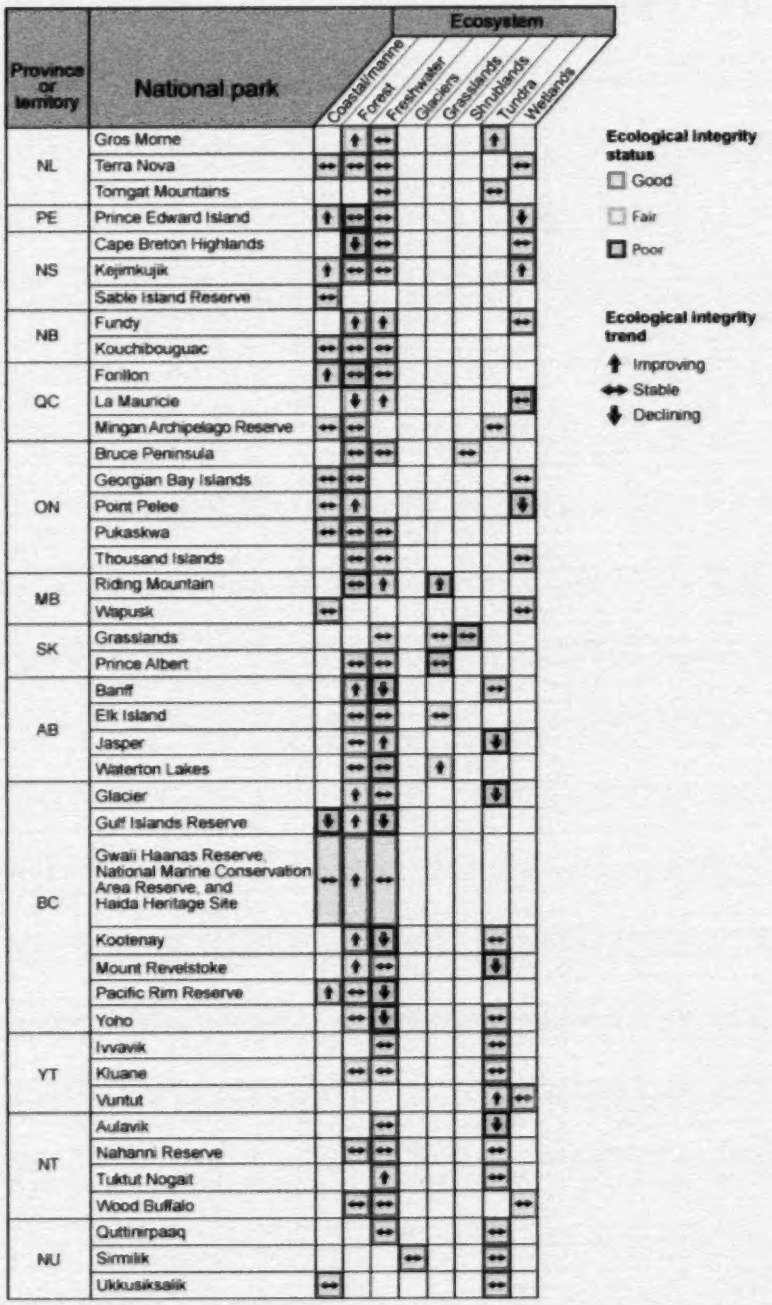
Ecosystem	Improving (number of ecosystems)	Stable (number of ecosystems)	Declining (number of ecosystems)	Total (number of ecosystems)
Forest	9	20	2	31
Shrublands	0	2	0	2
Grasslands	2	3	0	5
Tundra	2	12	4	18
Freshwater	5	24	5	34
Glaciers	0	1	0	1
Wetlands	1	9	2	12
Coastal/marine	4	10	1	15

Parks Canada identifies the major stressors of national parks as being the following:

- habitat loss
- habitat fragmentation (for example, building of roads and trails)
- losses of large carnivores, such as wolves
- air pollution
- pesticides
- invading non-native species
- over-use of national parks by humans

Parks are interlinked with their surrounding ecosystems and, despite their protected status, they are affected by many of the same pressures we place on the environment in general. Climate change and the long-range movement of pollution affect ecosystems inside and outside parks. The ecosystems respond differently to stressors, and they also respond differently to management actions. Some management actions may take many years to show results, particularly for slow-growing vegetation.

Figure 2. Ecological integrity status and trends of ecosystems in 42 national parks by province and territory, Canada, 2017



Data for Figure 2

Source: Parks Canada (2018).

About the indicator

What the indicator measures

The indicator summarizes the status and trends of ecosystems within national parks.

The condition of ecosystems within national parks is evaluated regularly using a series of monitoring measures that are designed to track biodiversity and natural processes within those ecosystems. These measures are rolled up to produce ecological integrity indicators[2] for up to 4 major ecosystems in each park.

Each ecological integrity indicator consists of a rating (good, fair, poor) and a trend (improving, stable, declining), based on monitoring results and knowledge of ecological systems. These are summed to provide an overall picture.

Why this indicator is important

The Canadian Environmental Sustainability Indicators (CESI) reports on the ecological integrity of national parks as an indicator of the condition of Canada's protected areas. National parks represent about a third of the protected area in Canada.

Parks Canada manages ecosystems to improve or maintain ecological integrity. Management plans systematically address opportunities for improving the integrity of park ecosystems. Funding for ecological restoration is prioritized for ecosystems that are in poor or declining condition. Environmental assessments and law enforcement are also key tools for maintaining the natural beauty of these treasured places.

Related indicators

Canada's conserved areas describe the amount and location of conserved areas using other instruments and show how well our conserved area network represents our broad ecological regions.

Global trends in protected areas compare the area protected in a set of peer countries.

Sustainably managed lands and forests

This indicator supports the measurement of progress towards the following 2016–2019 Federal Sustainable Development Strategy long-term goal: Lands and forests support biodiversity and provide a variety of ecosystem services for generations to come.

[2] Parks Canada refers to ecological integrity indicators in its reporting. This refers to the status and trends of key ecosystems in each park. The Canadian Environmental Sustainability Indicator's Ecological integrity of national parks indicator, however, refers to an aggregate indicator across all parks and park ecosystems.

Data sources and methods

Data sources

The indicator summarizes ecosystem scores from monitoring in National Parks. The report contains the most recent available information from each park ecosystem, blending data that is from 0 to 10 years old. Selected measures in each major park ecosystem are combined and the ecosystem is scored as good, fair or poor. Parks Canada monitoring for ecological integrity formally began in 2008 and is ongoing.

More information

Ecological integrity is reported for major ecosystems in 42 of Canada's national parks. Data are not yet available for Akami-Uapishkᵘ-KakKasuak-Mealy Mountains National Park Reserve, Nááts'ihch'oh National Park Reserve, Auyuittuq National Park, Qausuittuq National Park, or Rouge National Urban Park.

Between 1 and 4 major ecosystems in each park have ecological indicators. They are based on monitoring designed for the individual circumstances of each park. Examples of major ecosystems include forests, wetlands, and glaciers. Major ecosystems form most of the area of a park and are important to its biological functioning. For each major ecosystem, a scientifically sound set of environmental measures is developed, based on appropriateness, representativeness, monitoring needs and cost-effectiveness. Some examples of ecological integrity measures include wildlife surveys, estimates of plant productivity, water quality measurements, and invasive species surveys. Data for these underlying measures are gathered from a variety of sources, including on-the-ground field sampling, satellite imagery, academic and government partners, and traditional knowledge. Measured levels are compared to thresholds, such as whether a wildlife population is near desirable levels or whether water meets a water quality standard. Interim thresholds based on significant changes in desired traits are used when more biologically based assessments are not available. The frequency of monitoring varies from annually to once a decade, depending on the specific measurement.

Data are collated and stored in a database, the Information Centre for Ecosystems, to support management and reporting.

Data sets for individual measures are published in the Government of Canada Open Data Portal.

Methods

Ecological integrity monitoring is adapted to the ecology of each individual park. Information is gathered for each of the major ecosystems, and a determination is made as to whether the ecosystem is in good, fair or poor condition and whether it is improving, declining, or stable. Complete methods information is available in Parks Canada's 2011 Consolidated Guidelines for Ecological Integrity Monitoring in Canada's National Parks, available from the Protected Areas Establishment and Conservation Branch, Parks Canada.

More information

Ecosystem status is determined from the monitoring results as follows: each measure is assigned a score based on its condition compared to its threshold (good = 2, fair = 1, poor = 0). If one-third or more of the measures are scored poor, the ecosystem-level indicator is also scored poor. If less than one-third of the measures are scored poor, the average score of the measures (weighted equally) determines the ecosystem score.

The assessment of the overall trend for each major ecosystem is based on a change in its status from 5 previous years. If the condition of the ecosystem indicator has not changed, it is

considered stable unless a strong majority of the measures selected for that ecosystem have the same trend.

The national-level indicator is an overall assessment of ecological integrity across national parks. It is generated by summing the ecosystem-level indicator scores in each combination of status and trend for each park.

Recent changes

Information on the status and trends of park ecosystems has strengthened since the last time this indicator was updated, and results can be reported on a greater number of park ecosystems.

Caveats and limitations

The measurements used to determine the status and trend of major ecosystems are chosen to represent the most important elements of the ecosystem and thus provide an indication, rather than a complete assessment, of ecological integrity. Monitoring takes place against a background of natural variability, and because some locations are remote and some measurements are time-consuming or expensive to conduct, the frequency of monitoring may be low. This leads to unavoidable uncertainty in assigning status and trends to ecosystems.

Ecosystems are not of equal area or of equal importance in parks; comparisons between systems or between parks must be made with caution.

Some parks have not yet reported results, while others are basing their reports on incomplete suites of measures that reflect current data availability. Ecological integrity measures are selected using objective techniques to provide credible overall assessments. Where information is incomplete, preliminary data and statistical principles are used to support the selection of measures and the definition of thresholds.

The equal weighting of measures may not always reflect their relative ecological importance.

The data do not include provincial or other parks or other types of protected areas.

Resources

References

Parks Canada (2011) Consolidated Guidelines for Ecological Integrity Monitoring in Canada's National Parks. Protected Areas Establishment and Conservation Branch, Parks Canada.

Parks Canada (2018) Ecological integrity. Retrieved on May 10, 2018.

Parks Canada (2017) State of Canada's Natural and Cultural Heritage Places 2016. Retrieved on May 10, 2018.

Related information

Parks Canada

Annex

Annex A. Data tables for the figures presented in this document

Table A.1. Data for Figure 1. Ecological integrity status and trends of ecosystems in 42 national parks, Canada, 2017

Ecological integrity status	Improving (number of ecosystems)	Stable (number of ecosystems)	Declining (number of ecosystems)	Total (number of ecosystems)
Good	15	58	1	74
Fair	7	16	1	24
Poor	1	7	12	20
Total	**23**	**81**	**14**	**118**

Note: Park ecosystems may include forest, freshwater, wetlands, grasslands, shrublands, tundra, coastal/marine and glaciers, depending on what is present in each park. Akami-Uapishk^{U}-KakKasuak-Mealy Mountains, and Nááts'ihch'oh National Park Reserves and Auyuittuq and Qausuittuq National Parks did not report ecological integrity indicators in 2017. Rouge National Urban Park has also not yet reported.
Source: Parks Canada (2018).

Table A.2. Data for Figure 2. Ecological integrity status and trends of ecosystems in 42 national parks by province and territory, Canada, 2017

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
Newfoundland and Labrador (NL)	Gros Morne	Forest	Fair	Improving
Newfoundland and Labrador (NL)	Gros Morne	Freshwater	Good	Stable
Newfoundland and Labrador (NL)	Gros Morne	Tundra	Good	Improving
Newfoundland and Labrador (NL)	Terra Nova	Coastal/marine	Good	Stable
Newfoundland and Labrador (NL)	Terra Nova	Forest	Good	Stable

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
Newfoundland and Labrador (NL)	Terra Nova	Freshwater	Good	Stable
Newfoundland and Labrador (NL)	Terra Nova	Wetlands	Good	Stable
Newfoundland and Labrador (NL)	Torngat Mountains	Freshwater	Good	Stable
Newfoundland and Labrador (NL)	Torngat Mountains	Tundra	Good	Stable
Prince Edward Island (PE)	Prince Edward Island	Coastal/marine	Good	Improving
Prince Edward Island (PE)	Prince Edward Island	Forest	Poor	Stable
Prince Edward Island (PE)	Prince Edward Island	Freshwater	Good	Stable
Prince Edward Island (PE)	Prince Edward Island	Wetlands	Good	Declining
Nova Scotia (NS)	Cape Breton Highlands	Forest	Poor	Declining
Nova Scotia (NS)	Cape Breton Highlands	Freshwater	Good	Stable
Nova Scotia (NS)	Cape Breton Highlands	Wetlands	Good	Stable
Nova Scotia (NS)	Kejimkujik	Coastal/marine	Fair	Improving
Nova Scotia (NS)	Kejimkujik	Forest	Good	Stable
Nova Scotia (NS)	Kejimkujik	Freshwater	Good	Stable
Nova Scotia (NS)	Kejimkujik	Wetlands	Good	Improving
Nova Scotia (NS)	Sable Island	Coastal/Marine	Good	Stable

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
New Brunswick (NB)	Fundy	Forest	Good	Improving
New Brunswick (NB)	Fundy	Freshwater	Good	Improving
New Brunswick (NB)	Fundy	Wetlands	Good	Stable
New Brunswick (NB)	Kouchibouguac	Coastal/marine	Good	Stable
New Brunswick (NB)	Kouchibouguac	Forest	Good	Stable
New Brunswick (NB)	Kouchibouguac	Freshwater	Good	Stable
Quebec (QC)	Forillon	Coastal/marine	Good	Improving
Quebec (QC)	Forillon	Forest	Poor	Stable
Quebec (QC)	Forillon	Freshwater	Good	Stable
Quebec (QC)	La Mauricie	Forest	Fair	Declining
Quebec (QC)	La Mauricie	Freshwater	Fair	Improving
Quebec (QC)	La Mauricie	Wetlands	Poor	Stable
Quebec (QC)	Mingan Archipelago Reserve	Coastal/marine	Fair	Stable
Quebec (QC)	Mingan Archipelago Reserve	Forest	Good	Stable
Quebec (QC)	Mingan Archipelago Reserve	Tundra	Fair	Stable
Ontario (ON)	Bruce Peninsula	Forest	Good	Stable
Ontario (ON)	Bruce Peninsula	Freshwater	Good	Stable
Ontario (ON)	Bruce Peninsula	Shrublands	Fair	Stable

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
Ontario (ON)	Georgian Bay Islands	Coastal/marine	Good	Stable
Ontario (ON)	Georgian Bay Islands	Forest	Good	Stable
Ontario (ON)	Georgian Bay Islands	Wetlands	Fair	Stable
Ontario (ON)	Point Pelee	Coastal/marine	Fair	Stable
Ontario (ON)	Point Pelee	Forest	Good	Improving
Ontario (ON)	Point Pelee	Wetlands	Poor	Declining
Ontario (ON)	Pukaskwa	Coastal/marine	Good	Stable
Ontario (ON)	Pukaskwa	Forest	Good	Stable
Ontario (ON)	Pukaskwa	Freshwater	Good	Stable
Ontario (ON)	Thousand Islands	Forest	Good	Stable
Ontario (ON)	Thousand Islands	Freshwater	Fair	Stable
Ontario (ON)	Thousand Islands	Wetlands	Good	Stable
Manitoba (MB)	Riding Mountain	Forest	Poor	Stable
Manitoba (MB)	Riding Mountain	Freshwater	Good	Improving
Manitoba (MB)	Riding Mountain	Grasslands	Poor	Improving
Manitoba (MB)	Wapusk	Coastal/marine	Good	Stable
Manitoba (MB)	Wapusk	Wetlands	Good	Stable
Saskatchewan (SK)	Grasslands	Freshwater	Fair	Stable
Saskatchewan (SK)	Grasslands	Grasslands	Fair	Stable
Saskatchewan (SK)	Grasslands	Shrublands	Poor	Stable
Saskatchewan (SK)	Prince Albert	Forest	Good	Stable

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
Saskatchewan (SK)	Prince Albert	Freshwater	Good	Stable
Saskatchewan (SK)	Prince Albert	Grasslands	Poor	Stable
Alberta (AB)	Banff	Forest	Good	Improving
Alberta (AB)	Banff	Freshwater	Poor	Declining
Alberta (AB)	Banff	Tundra	Good	Stable
Alberta (AB)	Elk Island	Forest	Good	Stable
Alberta (AB)	Elk Island	Freshwater	Good	Stable
Alberta (AB)	Elk Island	Grasslands	Fair	Stable
Alberta (AB)	Jasper	Forest	Fair	Stable
Alberta (AB)	Jasper	Freshwater	Good	Improving
Alberta (AB)	Jasper	Tundra	Poor	Declining
Alberta (AB)	Waterton Lakes	Forest	Fair	Stable
Alberta (AB)	Waterton Lakes	Freshwater	Poor	Stable
Alberta (AB)	Waterton Lakes	Grasslands	Fair	Improving
British Columbia (BC)	Glacier	Forest	Fair	Improving
British Columbia (BC)	Glacier	Freshwater	Good	Stable
British Columbia (BC)	Glacier	Tundra	Poor	Declining
British Columbia (BC)	Gulf Islands Reserve	Coastal/marine	Poor	Declining
British Columbia (BC)	Gulf Islands Reserve	Forest	Fair	Improving

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
British Columbia (BC)	Gulf Islands Reserve	Freshwater	Poor	Declining
British Columbia (BC)	Gwaii Haanas Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site	Coastal/marine	Good	Stable
British Columbia (BC)	Gwaii Haanas Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site	Forest	Good	Improving
British Columbia (BC)	Gwaii Haanas Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site	Freshwater	Good	Stable
British Columbia (BC)	Kootenay	Forest	Good	Improving
British Columbia (BC)	Kootenay	Freshwater	Poor	Declining
British Columbia (BC)	Kootenay	Tundra	Good	Stable
British Columbia (BC)	Mount Revelstoke	Forest	Fair	Improving
British Columbia (BC)	Mount Revelstoke	Freshwater	Good	Stable
British Columbia (BC)	Mount Revelstoke	Tundra	Poor	Declining
British Columbia (BC)	Pacific Rim Reserve	Coastal/marine	Good	Improving

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
British Columbia (BC)	Pacific Rim Reserve	Forest	Good	Stable
British Columbia (BC)	Pacific Rim Reserve	Freshwater	Poor	Declining
British Columbia (BC)	Yoho	Forest	Fair	Stable
British Columbia (BC)	Yoho	Freshwater	Poor	Declining
British Columbia (BC)	Yoho	Tundra	Good	Stable
Yukon (YT)	Ivvavik	Freshwater	Good	Stable
Yukon (YT)	Ivvavik	Tundra	Good	Stable
Yukon (YT)	Kluane	Forest	Fair	Stable
Yukon (YT)	Kluane	Freshwater	Fair	Stable
Yukon (YT)	Kluane	Tundra	Good	Stable
Yukon (YT)	Vuntut	Tundra	Good	Improving
Yukon (YT)	Vuntut	Wetlands	Good	Stable
Northwest Territories (NT)	Aulavik	Freshwater	Good	Stable
Northwest Territories (NT)	Aulavik	Tundra	Poor	Declining
Northwest Territories (NT)	Nahanni Reserve	Forest	Good	Stable
Northwest Territories (NT)	Nahanni Reserve	Freshwater	Good	Stable

Province or territory	National park	Ecosystem type	Ecological integrity status	Ecological integrity trend
Northwest Territories (NT)	Nahanni Reserve	Tundra	Fair	Stable
Northwest Territories (NT)	Tuktut Nogait	Freshwater	Good	Improving
Northwest Territories (NT)	Tuktut Nogait	Tundra	Good	Stable
Northwest Territories (NT)	Wood Buffalo	Forest	Good	Stable
Northwest Territories (NT)	Wood Buffalo	Freshwater	Good	Stable
Northwest Territories (NT)	Wood Buffalo	Wetlands	Fair	Stable
Nunavut (NU)	Quttinirpaaq	Freshwater	Good	Stable
Nunavut (NU)	Quttinirpaaq	Tundra	Good	Stable
Nunavut (NU)	Sirmilik	Glaciers	Good	Stable
Nunavut (NU)	Sirmilik	Tundra	Good	Stable
Nunavut (NU)	Ukkusiksalik	Coastal/marine	Good	Stable
Nunavut (NU)	Ukkusiksalik	Tundra	Good	Stable

Source: Parks Canada (2018).

Additional information can be obtained at:

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